Poliomyelitis

1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To identify cases of polio.
2. To prevent transmission of polio.
3. To distinguish between wild-type polio and vaccine-associated paralytic polio.

B. Legal Reporting Requirements

1. Health care providers: **immediately notifiable to local health jurisdiction**
2. Hospitals: **immediately notifiable to local health jurisdiction**
3. Laboratories: no requirements for notification
4. Local health jurisdictions: **immediately notifiable to the Washington State Department of Health (DOH) Communicable Disease Epidemiology Section (CDES)**

C. Local Health Jurisdiction Investigation Responsibilities

1. Begin the investigation and notify CDES immediately.
2. Facilitate transport of specimens to DOH Public Health Laboratories (PHL).
3. Implement appropriate infection control measures.
4. Report all *confirmed* and *probable* cases (see definitions below) to CDES. Complete the polio investigation form (available at http://www.doh.wa.gov/notify/forms/polio.doc) and enter the data into the Public Health Issues Management System (PHIMS).

2. THE DISEASE AND ITS EPIDEMIOLOGY

Background

Wild polio virus was eliminated from the western hemisphere in 1991 but remains endemic in Nigeria, India, Pakistan and Afghanistan, where control efforts are ongoing. Beginning in 2003, polio re-emerged in many countries in Africa, facilitated by refugee movement. For up-to-date information regarding worldwide polio transmission see: http://www.polioeradication.org/casecount.asp#details

A. Etiologic Agent

Poliovirus (enterovirus subgroup) is an RNA virus. There are three serotypes (1, 2 and 3), and all can cause paralysis. There is no cross-protective immunity for the serotypes. Clinical poliomyelitis can be caused by wild-type viruses and, rarely, attenuated live (oral) vaccine strains.

B. Description of Illness

The virus infects the throat and intestine, with invasion of local lymph nodes. Up to 95% of polio infections are asymptomatic or inapparent. Some persons have nonspecific mild illnesses including fever, sore throat, or gastrointestinal symptoms. In rare cases

poliovirus infects the spinal cord or brain stem resulting in aseptic meningitis or acute asymmetric flaccid paralysis, which occurs in approximately one of 200 poliovirus infections. Symptoms of paralytic polio typically progress within a few days, achieve a plateau for weeks, and then resolve partially or fully. Legs are more often affected than arms. Bulbar paralysis affecting the cranial nerves may accompany extremity involvement or can occur as the sole paralysis.

C. Polio in Washington

The last endemic transmission of wild polio virus infection in the United States was in 1979; the last case of wild virus infection identified in Washington occurred in 1977. Vaccine-associated paralytic polio (VAPP) continues to occur sporadically, including in a Washington resident in 1993 who contracted the virus from a grandchild recently vaccinated with OPV. In 1997, the ACIP recommended routine use of inactivated (IPV) rather than oral polio vaccine to eliminate vaccine-associated paralytic polio in the United States. In 2000, an all IPV vaccine schedule was implemented which greatly reduced the occurrence of vaccine-associated paralytic polio. However, an unvaccinated Arizona resident contracted VAPP in 2005 during international travel to a polio-endemic area.

D. Reservoir

Humans, often persons with inapparent infections.

E. Modes of Transmission

Polio is mainly transmitted through the fecal-oral route including through contaminated water but can also be transmitted through droplet spread of respiratory secretions of an infected person. Infants receiving oral polio vaccine and secreting virus fecally have been the source of exposure for susceptible adults giving child care.

F. Incubation Period

Typically 6 to 20 days, range 3 to 35 days.

G. Period of Communicability

Persons with polio are most contagious shortly before and after the onset of symptoms. The virus is present in respiratory secretions for about a week and feces for up to six weeks after onset of illness. Persons with asymptomatic infections are also communicable.

H. Treatment

Treatment is supportive, including respiratory support during, and physical therapy following acute paralytic illness.

I. Immunity

Whereas oral vaccine produces intestinal immunity, injected vaccine protects only against paralytic disease, so does not prevent intestinal infection or subsequent shedding of the virus.

3. CASE DEFINITIONS

A. Poliomyelitis, paralytic (1997)

1. Clinical case definition

   Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss

2. Case classification

   Probable: a case that meets the clinical case definition

   Confirmed: a case that meets the clinical case definition and in which the patient has a neurologic deficit 60 days after onset of initial symptoms, has died, or has unknown follow-up status

3. Comment

   All suspected cases of paralytic poliomyelitis are reviewed by a panel of expert consultants before final classification occurs. Confirmed cases are then further classified based on epidemiologic and laboratory criteria[1]. Only confirmed cases are included in Table I in the *MMWR*. Suspected cases are enumerated in a footnote to the *MMWR* table.

   [1]Sutter RW, Brink EW, Cochi SL, et al. A new epidemiologic and laboratory classification system for paralytic poliomyelitis cases. Am J Public Health 1989;79:495-8.

B. Poliovirus infection, nonparalytic (2007)

1. Clinical description

   Most poliovirus infections are asymptomatic or cause mild febrile disease which may be accompanied by diarrhea. Poliovirus infections occasionally cause aseptic meningitis with full recovery. This case definition applies only to poliovirus infections found in asymptomatic persons or those with mild, nonparalytic disease (e.g., those with a nonspecific febrile illness, diarrhea, or aseptic meningitis). Isolation of polioviruses from persons with acute paralytic poliomyelitis should continue to be reported as "paralytic poliomyelitis".

2. Case classification

   Confirmed: Poliovirus isolate identified in an appropriate clinical specimen (e.g., stool, cerebrospinal fluid, oropharyngeal secretions), with confirmatory typing and sequencing performed by the CDC Poliovirus Laboratory, as needed.

3. Comment

   In 2005, a vaccine-derived poliovirus (VDPV) serotype 1 was identified in a stool specimen obtained from an immunodeficient Amish infant and, subsequently, from 4 other children in 2 other families in the infant's central Minnesota community[1]. Epidemiological and laboratory investigations determined that the vaccine-derived poliovirus had been introduced into the community about 3 months before the infant was identified and that there had been virus circulation in the community. Investigations in other communities in Minnesota and nearby states and Canada did not identify any additional infections or any cases of paralytic poliomyelitis.

Although oral poliovirus vaccine (OPV) is still widely used in most countries, inactivated poliovirus vaccine (IPV) replaced OPV in the United States in 2000[2]. Therefore, the Minnesota poliovirus infections were the result of importation of a vaccine-derived poliovirus into the United States and the first time a vaccine-derived poliovirus has been shown to circulate in a community in a developed country[3]. Circulating vaccine-derived polioviruses commonly revert to a wild poliovirus phenotype with increased transmissibility and high risk for paralytic disease; they have recently caused polio infections and outbreaks of paralytic poliomyelitis in several countries[3]. Introduction of vaccine-derived polioviruses in communities with low polio vaccination coverage pose the potential for transmission leading to outbreaks of paralytic poliomyelitis.

Because of the success of the routine childhood immunization program in the United States and the Global Polio Eradication Initiative, polio has been eliminated in the Americas since 1991. Because the United States has used IPV exclusively since 2000, the occurrence of any poliovirus infections in this country is a cause for concern. Reflecting the global concern for poliovirus importations into previously polio-free countries, the World Health Assembly of the World Health Organization has added circulating poliovirus to the notifiable events in the International Health Regulations (IHR)[4].

References

[1] CDC. Poliovirus infections in four unvaccinated children – Minnesota, August-October 2005. MMWR; 54(41); 1053–1055.

[2] CDC. Poliomyelitis prevention in the United States. Updated recommendations from the Advisory Committee on Immunization Practices (ACIP). MMWR 2000;49(No. RR-5).

[3] Kew OM, Sutter RW, de Gourville EM, Dowdle WR, Pallansch MA. Vaccine-derived polioviruses and the endgame strategy for global polio eradication. Ann Rev Microbiol 2005;59;587-635.

[4] CDC. Brief report. Conclusions and recommendations of the Advisory Committee on Poliomyelitis Eradication — Geneva, Switzerland, October 2005. MMWR 2005;54;1186-8.

4. DIAGNOSIS AND LABORATORY SERVICES

A. Laboratory Diagnosis

The laboratory diagnosis of polio is made by isolation of the polio virus from stool, throat specimens, urine or CSF (rare). Stool cultures are most likely to yield the organism. Acute and convalescent serologic tests can be done, but may be difficult to interpret because the rise in titer may occur prior to paralysis.

B. Tests Available at Washington State Public Health Laboratories (PHL)

PHL does not perform testing for polio virus but specimens should be sent to PHL as soon as possible. PHL will forward specimens to CDC for testing.

C. Specimen Collection

Stool and throat specimens for viral culture should be collected on any patient suspected to have polio. In general, at least two specimens should be obtained at least 24 hours apart as early in the illness as possible. Acute and convalescent serum can be collected although a rise in titer often occurs prior to paralysis.

Communicable Disease Epidemiology Section will assist with the determination of which additional specimens should be collected for diagnostic study. All specimens should be

shipped to PHL with a completed Virus Examinations form available at: http://www.doh.wa.gov/EHSPHL/PHL/Forms/SerVirHIV.pdf

5. ROUTINE CASE INVESTIGATION

Since polio has been eradicated in most of the world, confirmation of polio in a Washington resident will require an extensive investigation.

A. Evaluate the Diagnosis

Review the clinical presentation, physical exam findings (particularly flaccid paralysis), immunization history and risk factors for infection (e.g., recent travel to an endemic area or possible exposure to a person receiving oral polio vaccine). Decide whether pursuit of laboratory testing is appropriate and facilitate the transport of specimens to Public Health Laboratories (PHL), if needed. If a commercial laboratory isolated the polio virus in cell culture, request that the laboratory send the cell culture to PHL for confirmatory testing immediately.

B. Identify Source of Infection

Ask about the following exposures in the 3–35 days prior to onset:

- Travel to an endemic area
- Travel to or contact with persons from an area where oral polio vaccine is used
- Contact with a traveler arriving from an endemic area
- Contact with a person who recently received oral polio vaccine

C. Identify Potentially Exposed Persons

If polio is confirmed, DOH and the Centers for Disease Control and Prevention will assist with an extensive contact investigation. See below for Contact Management.

6. CONTROLLING FURTHER SPREAD

A. Infection Control Recommendations / Case Management

1. Hospitalized patients should be cared for using contact precautions for the duration of the illness.
2. If a person is confirmed to have polio, DOH and CDC will assist in making other infection control recommendations for the management of the case.

B. Contact Management

DOH and CDC will also assist with managing contacts of persons with polio. In 2005, a 7 month old unvaccinated, immunocompromised infant was diagnosed with vaccine-derived poliovirus in Minnesota. Contacts of this case were surveyed regarding polio vaccination status, immune status, and recent compatible illness in themselves and their family members. In addition, stool samples were obtained for viral culture and vaccination with inactivated poliovirus vaccine was offered to those susceptible contacts with ongoing risk of exposure. Lastly, contacts were educated and monitored for symptoms. (MMWR 2005;54(41):1053–55)

7. MANAGING SPECIAL SITUATIONS

Special situations will be handled on a case by case basis.

8. ROUTINE PREVENTION

A. Immunization Recommendations

Inactivated polio vaccine (IPV) is recommended for all children in the United States in a four dose series with doses given at 2 months, 4 months, 6–18 months and 4–6 years. The fourth dose is not required for school entry if the third dose is given on or after the 4th birthday. The vaccine contains three polio serotypes. IPV protects against paralytic polio but not intestinal infection. A person vaccinated with inactivated polio vaccine could acquire an intestinal polio infection during travel and transmit to others through the fecal-oral route without becoming ill.

Adults who have never been vaccinated against polio should receive three doses of IPV if they are:

- Traveling to polio-endemic or high-risk areas of the world.
- Working in a laboratory and handling specimens that might contain polioviruses.
- A health care worker in close contact with a person who could be infected with poliovirus.

Adults at high risk of coming in contact with polio virus who have received the 3 dose primary series should receive a booster dose of IPV.

Although no longer recommended in the United States, oral polio vaccine is used elsewhere and can cause paralytic disease in unimmunized travelers exposed such as through contaminated food or water.

For additional information regarding polio vaccination see:

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. 10th ed. Washington DC: Public Health Foundation, 2008.

B. Prevention Recommendations

Control of polio is accomplished through immunization. Unimmunized persons at risk of exposure, for example during travel to areas with known polio cases, should maintain strict prevention measures to avoid potential fecal-oral transmission, such as using safe drinking water during travel to areas with endemic polio and maintaining good hygiene practices if in contact with infants that are receiving oral vaccine.

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UPDATES